REMARKS

No new subject matter has been added to the specification.

Claims 1, 3-10, 12-19 and 21-44 are pending. Claims 2, 11 and 20 have been cancelled without prejudice or disclaimer. The subject matter of original claim 2 has been added to amended claim 1. The subject matter of original claim 11 has been added to amended claim 10. The subject matter of original claim 20 has been added to original claim 19.

Support for the amended independent claims 1, 10 and 19 is found in paragraph [0041] of the application as filed.

Rejections Under 35 USC §112

Claims 3-4 and 12-13 were rejected under 35 U.S.C. §112, second paragraph. This rejection is respectfully traversed by the amendments to the claims. Notice that amended claims 1, 10, 19 and 29 all recite "a positive power".

Rejections Under 35 USC §102

Claims 1, 5-10, 14-19 and 23-27 were rejected under 35 U.S.C. §102(b) in view of Shimazaki (US 5,832,122). This rejection is respectfully traversed as follows.

In order to sustain a §102 rejection of independent claims 1, 10 and 19, each and every feature of the claims must be taught by the reference.

In regards to the following references: Shimazaki US 5,832,122; "Improved Threshold Matrices for Ordered Dithering" by Purgathofer et al.; "Digital Haftoning" by Ulichney, MIT Press (1987); Woods US 6,833,933; Ulichney US 4,955,065; Roberts US 3,742,129; Russell US 2003/0048477; Yu US 6,433,891; Ilbery US 6,124,844 and Woods

GB 2,352,579. None of the above references from the record or submitted with the attached IDS of even date are considered relevant with regard to novelty because they all deal with the generation of strictly dispersed dot halftones in contrast to independent claim 1 which specifically deals with amplitude modulation screens. This technical feature is emphasized by an amendment to independent claims 1, 10, 19 stating: "comprising a plurality of virtual halftone dot centers, each of said halftone dot centers being surrounded by a cluster of associated microdots".

Since each and every feature of the amended claims is not disclosed in Shimazaki, the §102(b) rejection is overcome.

Rejections Under 35 USC §103

Claims 2, 11 and 20 were rejected under 35 U.S.C. §103 over Shimazaki in view of Woods US 6,833,933. Claims 3-4, 12-13 and 21-22 are rejected under 35 U.S.C. §103 over Shimazaki in view of Woods and design choice. Claims 28, 37-41 and 43 are rejected under 35 U.S.C. §103 over Shimazaki in view of Ulichney '065. Claims 29 and 32 are rejected under 35 U.S.C. §103 over Shimazaki in view of Ulichney '065 and Woods '933. Claims 30-31 and 33-34 are rejected under 35 U.S.C. §103 over Shimazaki in view of Ulichney '065, Woods '933 and design choice. Claims 35-36 and 42 are rejected under 35 U.S.C. §103 over Shimazaki in view of Ulichney '065 and Roberts '129. Claim 44 was rejected under 35 U.S.C. §103 over Shimazaki in view of Ulichney '065 and Russell. Each of these rejections are respectfully traversed in view of the amendments and the following arguments.

In determining a prima facie case for obviousness under 35 U.S.C. §103, it is necessary to show that the combination of prior art teachings is proper, and that those teachings are sufficient to *suggest* making the claimed modifications to one of ordinary skill in the art.

The applicant wishes to demonstrate that the specific claimed feature of "the aggregate distance function for each virtual halftone dot center comprises a sum of inverse distances from said virtual halftone dot center to each virtual halftone dot center already included in the ordering sequence, with each of the distances raised to a positive power" is not found in any of the related prior art documents and hence there is no teaching or suggestion to combine the references, nor would an arguably improper combination result in the applicant's invention.

Shimazaki col. 5, lines 5-50 discloses that a distance function is used having the form:

$$RR = \sqrt{\left((xk1 - x5i)^2 + (yk1 - y5i)^2\right)}$$

This distance function is used to find the position of a threshold that maximizes the minimum distance with regard to already established thresholds. However, the document does not disclose or suggest a sum of inverse distances, so there is no equivalent of an "aggregate" distance function in the meaning of claim 1 of the current application.

The reference work "Digital Halftoning" by Ulichney does not mention the use of an aggregate distance function to obtain a sequence order. "Digital Haftoning" is hence not relevant with regard to an inventive step of the current application.

Woods (US6833933 or GB2352579) mentions the use of a distance function "D" (see col. 3, lines 6-10). A very general form of an aggregate distance function is given:

$$W = \sum_{i=1...n} f(P_i, P_c)$$

However this general aggregate distance function does not disclose, describe or suggest the claimed feature in the present invention of "the aggregate distance function for each virtual halftone dot center comprises a sum of inverse distances from said virtual halftone dot center to each virtual halftone dot center already included in the ordering sequence, with each of the distances raised to a positive power".

Ulichney US4,955,065 describes a solution for the problem of directional image quality artifacts in error diffusion by using a serpentine scan to process the pixels in an image. It does not mention the use of an aggregate distance function of any nature. Ulichney '065 hence does not teach or suggest the present invention as claimed.

Roberts US3,742,129 teaches a screening system using specific angles for the purpose of halftoning multi-color images. Roberts does not teach or suggest the present invention as claimed.

Russell US 2003//0048477 was filed on August 27, 2001. The attached Declaration Under 37 CFR §1.131 is submitted to antedate the Russell reference which has been applied for 35 USC §103 obviousness as prior art under 35 USC §102(a). Russell does not claim the same invention as recited in the amended claims herein.

Information Disclosure Statements

Attached is a copy of the reference "A Review of Halftoning Techniques" by Robert Ulichney, Color Imaging: Device-Independent Color, Color Hardcopy and Graphic Arts V, Proc. SPIE vol. 3963 (January 2000) as cited in the IDS filed on April 1, 2002. The submission of this document is believed to satisfy the objection noted in paragraph #1 of the 11/15/2005 Office Action. Please now consider all the references cited in the 4/1/2002 IDS.

A second Information Disclosure Statement is attached with 3 additional references (Levien, Kang and Purgathofer) for consideration. Below is a discussion comparing features of the invention as claimed to the 3 references recited in this IDS.

1. Kang

The newly disclosed reference "Dispersed Micro-Cluster Halftoning" by Kang teaches a micro-cluster halftoning technique based on frequency modulation, super cell and multi-dot center approaches. The micro-clusters in Kang correspond with microdots clustered around halftone dot centers in the current application. The supercell in Kang corresponds with the base cell in the current application. The frequency modulation in Kang corresponds with the ordering sequence in the current application.

Kang also teaches (page 2) "The nuclei within an NxN array are arranged using an optimum pixel dispersion scheme. It is based on the assumption an additional pixel is put in a place where the average distance function from neighboring pixels is the highest and the variance is the lowest, to maintain as far as possible an approximately equal distance to all neighbors".

Kang also teaches a criterion:

$$A = \sum_{i}^{k} |d_i - d_{ave}| / d_{ave}$$

wherein d_i is the distance between the added pixel and one of the nearest pixels, and d_{ave} is the average distance of d_i, with i from 1 to k. The smaller A, the better a pixel is dispersed.

Kang clearly establishes the concept of an aggregate distance function. However, the document does not disclose a technical feature that said aggregate distance function "comprises a sum of inverse distances from said from said virtual halftone dot center to each

virtual halftone dot center already included in the ordering sequence, with each of the distances raised to a positive power" as in amended claim 1.

Hence the pending claims are patentably distinguished from Kang.

2. *Purgathofer*

Purgathofer teaches the use a force field function to influence the position of an additional halftone dot in a way that said additional dot is discouraged from being places close to already existing points to avoid clustering. The force field function that is suggested in Purgathofer is radially symmetric and has the form:

$$f(r) = 1/\exp\left(\left(\frac{r}{s}\right)^p\right)$$

$$r = \sqrt{x^2 + y^2}$$

in which x and y are coordinates of a halftone dot and p and s are parameters to control the function. The force field function is a generalization of the formula that describes the normal distribution, in which latter case p=1.

As new halftone dots are added in the method of Purgathofer, their force fields are added to a force field matrix. To avoid problems at the boundaries of the repeatedly used threshold matrix, the top and bottom edge and the left and right edge of the for-field matrix are joined, changing it topologically to a torus.

The method in Purgathofer leads to a threshold matrix that produces frequency modulation halftones having desirable blue noise characteristics. The aggregate distance function in Purgathofer is different from "a sum of inverse distances from said virtual halftone dot center to each virtual halftone dot center already included in the ordering

sequence, with each of the distances raised to a positive power", because it is not the inverse distance but the exponential function of said inverse distance that is aggregated.

3. Levien

Levien US 5,276,535 col. 9, lines 1-20 mentions the use of Gaussian bump function. The reasoning and distinctions noted in the previous paragraph hence completely holds for this case. Moreover, Levien discloses a post processing method to reduce internal moiré. The method uses a bell shaped function instead of an aggregate distance function. Levien does not involve a step of establishing an ordering sequence as in the present invention.

Conclusion

Given that none of the applied prior art methods disclose or suggest "an aggregate distance function for each virtual halftone dot center comprises a sum of inverse distances from said virtual halftone dot center to each virtual halftone dot center already included in the ordering sequence; each of the distances raised to a positive power", it would not have been obvious to a person skilled in the art at the time of the filing of the current application to use such an aggregate function for a method as claimed in the current application.

The prior art made of record and not relied upon has been reviewed but is not considered material to the patentability of the invention.

Miscellaneous

Also attached is: a substitute Declaration and Power of Attorney which corrects the inadvertent filing date listed on the original Declaration; 2 PTO Form 1595 cover sheets and 2 separate Assignments; an IDS and references; the Ulichney reference entitled "A Review of Halftoning Techniques" and a USPO Express Mailing certificate no. ED454327537US.

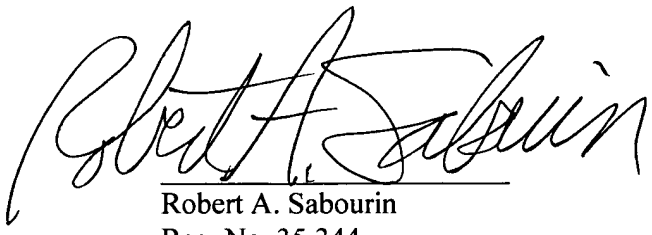
Please accept this paper as a Petition for Extension of Time as required.

Please charge all fees due for papers with this response, including extension fees, Rule 131 fees, etc. under this general authorization to Deposit Account No. 13-3377.

It should be noted that the above arguments are directed towards certain patentable distinctions between the claims and the prior art cited. However, the patentable distinctions between the pending claims and the prior art cited are not necessarily limited to those discussed above.

In view of the foregoing remarks and amendments, it is respectfully submitted that each rejection of the Office Action has been addressed and overcome so that this application is now in condition for allowance. The Examiner is respectfully requested to reconsider the application, withdraw the rejections and/or objections, and pass the application to issue. Should questions arise during examination, the Examiner is welcome to contact the applicant's attorney as listed below.

Respectfully submitted,



Robert A. Sabourin
Reg. No. 35,344

Agfa Corporation
Law & Patent Department
200 Ballardvale Street
Wilmington, MA. 01887-1069

Tel: 978-284-5604

RAS/pc